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EXAMINER	
ROBINSON, LAUREN E	
ART UNIT	**PAPER NUMBER**
1709	

NOTIFICATION DATE	DELIVERY MODE
08/24/2007	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/541,462	OHNO ET AL.	
	Examiner	**Art Unit**	
	Lauren E.T. Robinson	1709	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 July 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-24* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☐ Claim(s) *1-24* is/are rejected.

7)☒ Claim(s) *8 and 20* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *06 July 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *6 July 2005*.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject mat ter which the applicant regards as his invention.

Claims 8 and 20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 8 and 20 are indefinite due to applicants failing to claim what has a higher sintering aid content than said ceramic coarse particles. Appropriate correction is required.

For the purpose of applying prior art to claims 8 and 20, the examiner interprets the claim to read that the sintering aid content is higher in the bonding material with ceramic fine particles than the ceramic coarse particles.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 3-4, 7-12 are rejected under 35 U.S.C. 102(b) as being anticipated by Takahashi et. al (US Patent No. 6341701).

Takahashi et. al. teach a ceramic porous membrane comprised of ceramic particles and ceramic sol particles (abstract) that can be used as a filter (Pg. 1, Col. 1, Par. 4). The ceramic sol particles are used as a binder for the ceramic particles to hold the particles together (Pg. 1, Col. 1, Par. 1) and are sintered to the said ceramic particles to form neck between particles (Pg. 1, Col. 1, Par. 4). The said ceramic sol particles have an average particle size from 5nm to 100nm while the ceramic particles have a particle size in between 100nm to 1000 nm (Pg. 2, Col. 1, Par. 8-9). This teaching is equivalent to the applicants' claim 1 and 12. Takahashi et. al. also disclose that if the ceramic sol particles have an average particle diameter of more than 100nm that the binding force (since the particles form the bonding layer) of the particles themselves is weak (also considered brittle) and the ceramic sol particles cannot strongly bind the ceramic particles (Pg. 2, Col. 1, Par. 9). This teaching is equivalent to the applicants' claim 3 and 4 since the ceramic sol particles are smaller than the said ceramic particles, the ceramic sol particles form the bonding layer, and if the ceramic sol particles are to large the ceramic sol particles are weak (brittle) and do not have enough strength to bind the stronger ceramic particles.

The said ceramic particles in this reference can be chosen from a group consisting of SiO_2, TiO_2, ZrO_2, $Al_2O_3 \cdot SiO_2$, $MgO \cdot Al_2O_3$ and mixtures thereof (Pg. 2, Col. 1, Par. 8) while the ceramic sol particles are chosen from a group consisting of SiO_2, ZrO_2, $Al_2O_3 \cdot SiO_2$, $MgO \cdot Al_2O_3$ and mixtures thereof (Pg. 2, Col. 2, Par. 2). The

compounds used for the ceramic sol particles (bonding layer) selected from these groups contain the applicants' said sintering aids aluminum and oxide in claim 7. In example 3 of Takahashi et. al.'s disclosure, they explain the use of mullite ($Al_2O_3 \cdot SiO_2$) as the ceramic sol liquid and SiO_2 as the ceramic particle group to prepare the ceramic porous body (Pg. 4, Col. 1, Par. 6-7). This example is equivalent to applicants' claim 8 due to a higher content of aluminum and oxide being present in the ceramic sol liquid than the oxide aid in the said ceramic particle group.

Takahashi et. al. also teach that the ceramic particles and ceramic sol particles mentioned above cannot form the said ceramic porous body unless the particles are sintered at a high enough temperature. They also disclose that since sintering at high temperatures involve disadvantages that electric charges are high and a setter of refractory material must be used, they recommend the use of silicon carbide to sinter the ceramic particles and ceramic sol particles together (Pg. 1, Col. 1, Par. 6) which is what applicants claim in claim 9 of their disclosure.

While the ceramic sol particles (5nm-100nm) are smaller than the ceramic particles (100nm-1000nm) used in this reference the ceramic sol particles also only occur at 1 to 30% by weight of the ceramic particles (Pg. 2, Col. 2, Par. 3). Using these values, if a ceramic sol particle has an average size of 5nm, a ceramic particle has an average size of 100nm, the ceramic sol particle occurs at 20% by weight and ceramic particles occur at 80% by weight, then the ratios would be 20:1 in average ceramic particle size to ceramic sol particle and 4:1 in weight percent of ceramic particles to

ceramic sol particles. These said ratios would fall within the applicants' ranges in claims 10 and 11 of their disclosure.

2. Claims 1-2, 4-9, 11-12 are rejected under 35 U.S.C. 102(b) as being anticipated by Waku et. al. (US Patent No 5981415).

Waku et. al. teach a ceramic composite material consisting of two or more crystal phases of different components (abstract). The said ceramic material is to be made to have high mechanic strength and excellent thermal stability in high temperature settings for using as a filter, etc (Pg. 1, Col. 1 Par. 1) for filtering high temperature gases (Pg. 2, Col. 1, Par. 2). Waku et. al. disclose that silicon carbide has been known to develop said ceramic materials (Pg. 1. Col. 1, Par. 2) and that powder sintering methods are the most popular when producing the said ceramic materials (Pg. 1, Col. 2, Par. 3). The composite ceramic material that the reference claims as one embodiment of their invention is a material comprised of a single crystal/polycrystal phase (Pg. 1, Col. 2, Par. 4). One process that this reference discloses for making the said composition is the process comprising of forming a ceramic powder with an inorganic binder, where the particle size distribution is controlled (Pg. 2, Col. 1, Par. 2). Waku et. al. also teach that using conventional sintered silicon methods lead to coarse plate crystals with less bonding between the crystals leading to low mechanic strength an making the bonding material weak (Pg. 2, Col. 1, Par. 5). This reference also discloses that the ceramic material used consists of at least one crystal phase having pore (Pg. 3, Col. 1, Par. 9) and that two ceramic powders are mixed in such a ratio to form a ceramic composite

material having a desired composition and then wet mixing occurs (bond material) with alcohol (Pg. 3, Col. 2, Par. 1).

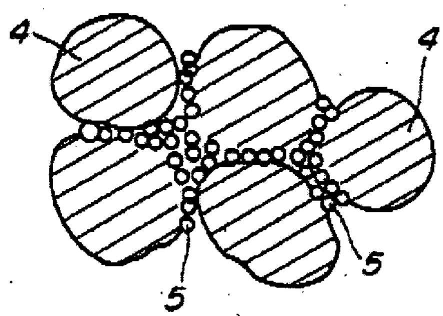
In example 2 of the reference's disclosure an alpha-dialuminum trioxide is mixed with a Gd_2AlO_3 powder in a mol % ratio of 78.0/22.0. This ratio falls within the applicants' weight ratio in claim 11. Upon mixing, wet ball milling occurred in ethanol (bonding material mixed with powder) wherein this would be equivalent to applicants' claim 3 that the bonding layer was formed with the powder to form a slurry. This slurry was then sintered and then cooled

at a rate of 100 degrees. Waku et. al. teach that the solidified body that was formed was a ceramic composite material consisting of two phases of an alpha dialuminum trioxide single crystal and a Gd_2AlO_3 polycrystal (Pg. 5, Col 1, Par. 11 and Pg. 5, Col. 2, Par. 6).

3. Claims 1,3, 7, and 10-12 are rejected under 35 U.S.C. 102(b) as being anticipated by Maebashi (US Patent No. 5098571)

Maebashi teaches a process for manufacturing a ceramic filter wherein the said filter is produced by preparing an aggregate comprising alumina coarse particles and a sintering aid comprising alumina-zirconia (abstract). The following illustration from the reference's disclosure shows the porous (plurality of tiny holes shown in the illustration, applicants' claim 12) ceramic sintered body that produces the said filter.

FIG.2



In this figure, the alumina coarse particles (4) are bonded together by the alumina-zirconia sintering aid (5) which form the bonding material between the ceramic coarse particles. The said alumina coarse particles have an average particle diameter of 20-100 um and the said alumina-zirconia mixed particle-sintering aid has an average particle diameter of 0.1 to 0.3 um (Pg. 1, Col. 2, Par. 13-14). This illustrates one being the alumina-zirconia mixed particles being smaller than the coarse particles and this teaching is equivalent to the applicants' claims 1, 3, 7, and 12. Using these values, if the alumina particle had a size of 20 um and the sintering aid had a size of 0.1 um, the ratio would be 200:1 which is equivalent to the applicants' claim 10. Furthermore, Maebashi discloses that the alumina particles and the alumina-zirconia mixed particles are blended in a proportion of 5-1 weight ratio and this ratio falls within the limits of the applicants' claim 11.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1-12 are rejected under 35 U.S.C. 103(a) as being obvious over Waku et. al. (US Patent No 5981415) in view of Takahashi et. al (US Patent No. 6341701).

Waku et. al. teach a ceramic composite material consisting of two or more crystal phases of different components (abstract) wherein the said ceramic material is to be made to have high mechanic strength and excellent thermal stability in high temperature settings for using as a filter, etc (Pg. 1, Col. 1 Par. 1) for filtering high temperature gases (Pg. 2, Col. 1, Par. 2) as mentioned above.

While Waku et. al. discloses a ceramic sintered body that can be used as a filter comprised of coarse particles (single crystal dialuminum trioxide), fine ceramic particles (Gd_2AlO_3) polycrystal that contain an aluminum sintering agent and a grain boundary between the crystals), a binder where the binder is sometimes weak (brittle), and the particles being in the correct weight ratio , they are silent with regard to the dialuminum trioxide particles being larger than Gd_2AlO_3 particles at the correct size ratio.

Takahashi et. al. teach a ceramic porous membrane comprised of ceramic particles and ceramic sol particles being in the correct size and weight ratios, containing a sintering agent and formed from silicon carbide as mentioned above, but they are

silent with regard to the ceramic particles being a single crystal structure and the bonding material of ceramic sol particles being a polycrystalline structure wherein after sintering, the grain boundaries remain.

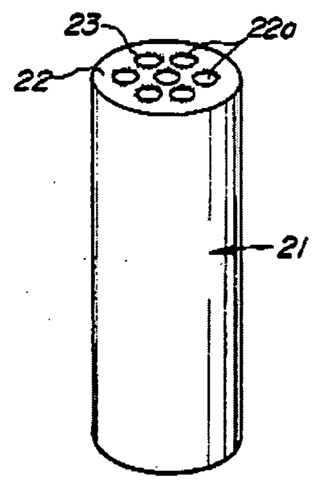
Since both Waku et. al. and Takahashi et. al. teach a ceramic porous body that is comprised of ceramic coarse and ceramic fine particles in the correct weight ratio and formed by silicon carbide with a sintering agent being present and since Waku et. al. teach the different crystals formed with a grain bondary remaining following sintering, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Waku et. al.'s teaching by forming the ceramic porous body with ceramic fine particles being smaller than coarse particles at the correct ratio (claims 3 and 10) which was taught by Takahashi et. al.

6. Claims 13-24 are rejected under 35 U.S.C. 103(a) as being obvious over Waku et. al. (US Patent No 5981415) in view of Takahashi et. al (US Patent No. 6341701), Maebashi (US Patent No. 5098571), and Larsen et. al (Patent No. 5716559).

Waku et. al. as discussed above, teach that the ceramic body can be used as a filter, etc (Pg. 1, Col. 1 Par. 1) for filtering high temperature gases and Takahashi et. al. as discussed above teach that the ceramic body can also be used as a filter (Pg. 1, Col. 1, Par. Par. 2). While both references teach a ceramic body used for a filter they are silent with regard to the filter being of a honeycomb structure and either end of the honeycomb cells are plugged.

Maebashi teaches a process for manufacturing a ceramic filter wherein the said filter is produced by preparing an aggregate comprising alumina coarse particles and a sintering aid comprising alumina-zirconia as described above. The ceramic filter comprised of this material with the above mentioned characteristics is a honeycomb like structure comprising a pillar-shaped porous member illustrated below.

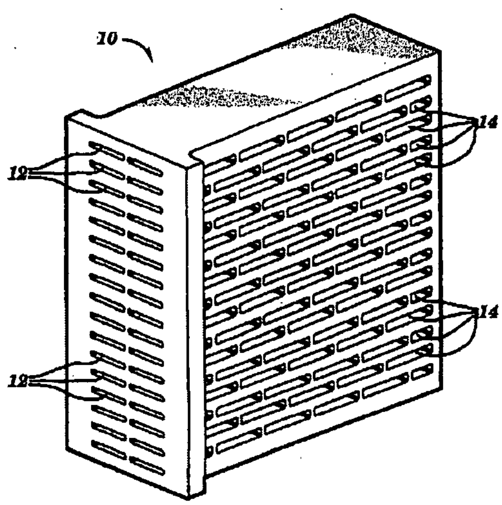
FIG.3



This illustration shows the filter (21) comprised of a support (22) made of the ceramic particles provided with a number of through-holes (22a) in its longitude direction (Pg. 2, Col. 1, Par. 6). The examiner interprets the cells (22a) to be a gas passageway since gas can be considered air passing in and out of said cells. While he teaches a honeycomb structure ceramic filter (using the particle materials as described above) comprised of a pillar-shaped porous ceramic material and containing a plurality of cells, he is silent with regard to one end portion of said cells being plugged, the particles

comprising the said filter being of a single crystal structure for the alumina coarse particles, a polycrystalline structure for the alumina-zirconia where the grain boundary remains after sintering, a sintering agent being in higher content in the said bonding material than the main particles, and the bonding material and the main particles being formed by silicon carbide.

Larsen et. al. teach a ceramic filter comprised of a ceramic filter green body (sintered body) that filters particulates from hot gases (abstract). The said filter is made by filling a mold with a slurry, which contains inorganic colloidal sol as a binder and inorganic particles. The green body is then frozen in the mold and once frozen it is removed to be warmed, air dried and then undergo a final firing step (Pg. 1, Col. 2, Par.) The following is an illustration of the reference's invention.



This figure shows the ceramic filter after the removal from the mold which is regarded as the reference's invention that has a honeycomb structure comprised of a plurality of pillar-shaped porous members. The said honeycomb structure filter contains a plurality

of open cells that allow gas to flow through in a longitudinal direction to said cell walls. Larsen et. al. disclose that an array of parallel rows of channels (pillar-shaped porous members comprising cell pathways) is present that are open at one end and closed at the other end (Pg. 1, Col. 2, Par. 3).

Larsen et. al. also teach that the slurry that forms the green body mold can be made with inorganic particles chosen from the group consisting of alumina, mullite, cordierite, silicon carbide (applicants' claim 21), silica, silicon nitride, aluminum nitride, magnesia, aluminum-magnesia spinel, aluminum titanate, zircon, and zircon clays (Pg. 2, Col. 1, Par 2) and that the inorganic particle sol being preferably a silica sol but can be any inorganic sol (Pg. 2, Col. 1, Par. 4). While Larsen et. al. teach a ceramic honeycomb filter with one end closed made from a sintered porous body of inorganic particles and inorganic particle sol, they are silent with regard to the inorganic particles in the inorganic particle sol being smaller than the main inorganic particles, the two sets of particles being in either a single or polycrystalline structure, a sintering aid being present and in higher content within the bonding layer than the other particles, and the ratios of the different sizes and weights of the particles.

Since Maebashi and Larsen et. al. both teach a filter formed by a ceramic porous body, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Maebashi's teaching by including that one end of cells are plugged, which is taught by Larsen et. al., since Maebashi's teaching included that the fine particles were smaller than the main particles. It then would have been further obvious to one having ordinary skill in the art at the time the invention was made to

then combine this modified filter with the modified ceramic body of Waku et. al.'s disclosure as mentioned above, which has the applicants' desired characteristics. The combination of the modified filter comprised of the modified ceramic body would be equivalent to applicants' claims 13-24.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lauren E.T. Robinson whose telephone number is (571) 270-3474. The examiner can normally be reached on Mon. through Fri. 7:30 to 5:00 EST (First Fri Off).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, D. Lawrence Tarazano can be reached on (571) 272-1515. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Lauren E.T. Robinson
Examiner
Art Unit 1709

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D. LAWRENCE TARAZANO
PRIMARY EXAMINER